



**Intraoperative Neuromonitoring**  
Functional Neurosurgery  
Pain Treatment  
Neurological Diagnostic

**pIOM<sup>®</sup>**

» PREPARING AND USING THE pIOM METHOD  
DURING A MESORECTAL EXCISION

APPLICATION NOTE



pelvic Neuromonitoring

# Introduction

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## IOM Definition

**Intraoperative neuromonitoring (IOM)** refers to the graphic and acoustic display and documentation of the neurophysiological activity of nerves during a surgical procedure.

Monitoring the electrophysiological functioning of nerve pathways makes it possible to keep track of their function during an operation. The electrical stimulation of nerves causes depolarisation and hence a modulation of the basic activity. In the case of **pelvic IOM** the consequence of this is an increase in the activity of the innervated smooth muscles, which can be recorded by electrodes attached in or on the muscle. The electrical potentials which occur here are referred to as **electromyographic discharge (EMG)**.

Measurement of muscle activity, and hence also their intact innervation, can also be done indirectly. Therefore in **pelvic IOM** the activity of the M. detrusor vesicae can be determined by means of the pressure in the bladder.



## pIOM — Methods and Application

**pIOM**<sup>®</sup>

The stimulation point is in the minor pelvis, in particular the **Plexus hypogastricus inferior** and the **Nn. splanchnici pelvici**.

**Urogenital functions** and **anorectal function** are monitored by means of bladder pressure measurement and the electrical discharge at the internal anal sphincter. The continuous display of anal sphincter activity and a display of the activity of the bladder muscles allows the autonomous nerves in the lesser pelvis to be identified during surgery.

**The aim of this monitoring is to locate and check the functional integrity of the nerves in the pelvis in order to avoid damage to these nerves during surgery.**

In the worst case scenario, damage to the autonomous nerves in the pelvis can lead to urogenital and anorectal and sexual function disorders.

The monitoring of nerve function is documented and saved by the software. This means that **subsequent evaluation** of the monitoring is possible. On the basis of this, in the event that there is any reduced nerve conduction, targeted treatment can be commenced accordingly.

Many surgical procedures in the minor pelvis which put the autonomous nerve system at risk are possible fields of application. In addition disciplines such as PROCTOLOGY, GYNAECOLOGY or UROLOGY can profit from pelvic monitoring.

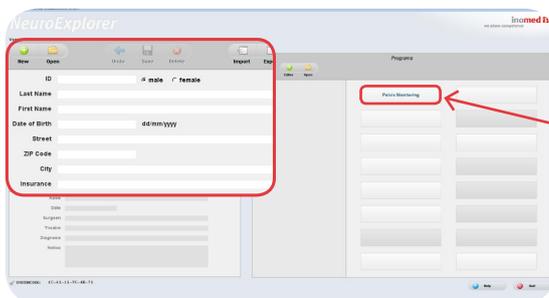
# » Preparation

## » Preparing the ISIS

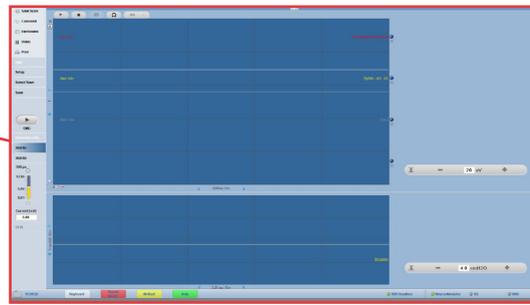
### 1. Plugging in and switching on the equipment



### 2. Entering patient data



### 3. Opening scenario



## ANAESTHESIA

The patient must be completely relaxed during neuromonitoring.

This is essential as otherwise it is not possible to monitor autonomic nerves reliably.

The muscle activity of smooth and striated musculature tends to merge in the EMG measurement, meaning that allocation and interpretation becomes impossible.

If the patient is relaxed, the activity of the striated musculature is suppressed and only the activity of the smooth musculature (the internal anal sphincter) can be seen in the EMG signal.

In addition TIVA is recommended. During anaesthesia under gas a weakening of the EMG signals has been observed. In the worst case, weak signals can be reduced to the extent that they are no longer recognised as a muscle response. This effect can be prevented by the use of TIVA.

Wherever possible epidural anaesthesia should only be done after all measurements have been completed in order to exclude any interference with the EMG signals.

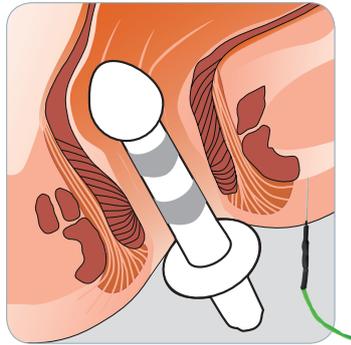
See also:

Heid et al.: Impact of inhalation vs. intravenous anaesthesia on autonomic nerves and internal anal sphincter tone. *Acta Anaesthesiol Scand.* 2015 Oct; 59(9):1119-25. doi: 10.1111/aas.12535

**Please arrange temporary interruption of the flow of urine with the anaesthesia personnel as otherwise this may produce irregularities in determining the patient's fluid balance. If a urinary catheter with integrated temperature measurement is used, this may be affected during bladder pressure measurement.**

## » Preparing the EMG

### 1. Positioning the rectal electrode



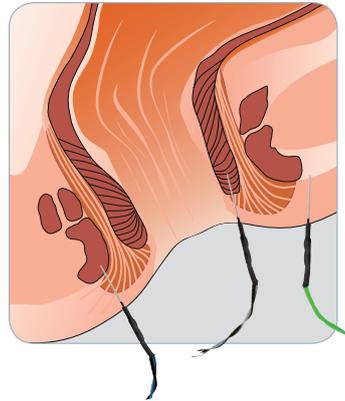
**Note:**  
No lubricant may be used on the rectal electrode for positioning!

### 2. Connecting up the rectal electrode



### 1. Inserting the needle electrodes

OR



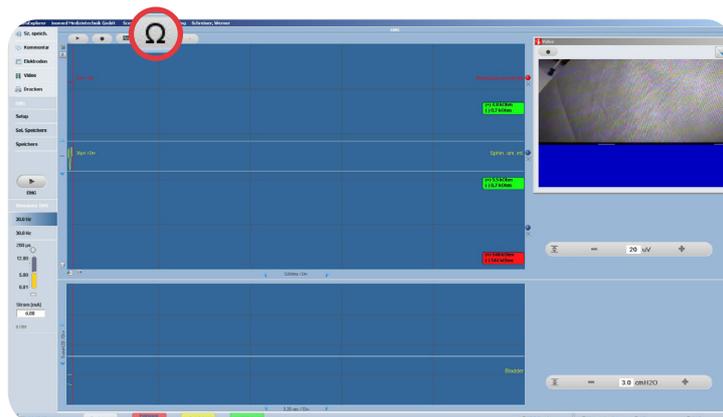
### 2. Connecting up the needle electrodes



### 3. Connecting the adapter box to the ISIS system and the USB connector



### 4. Checking electrode contact



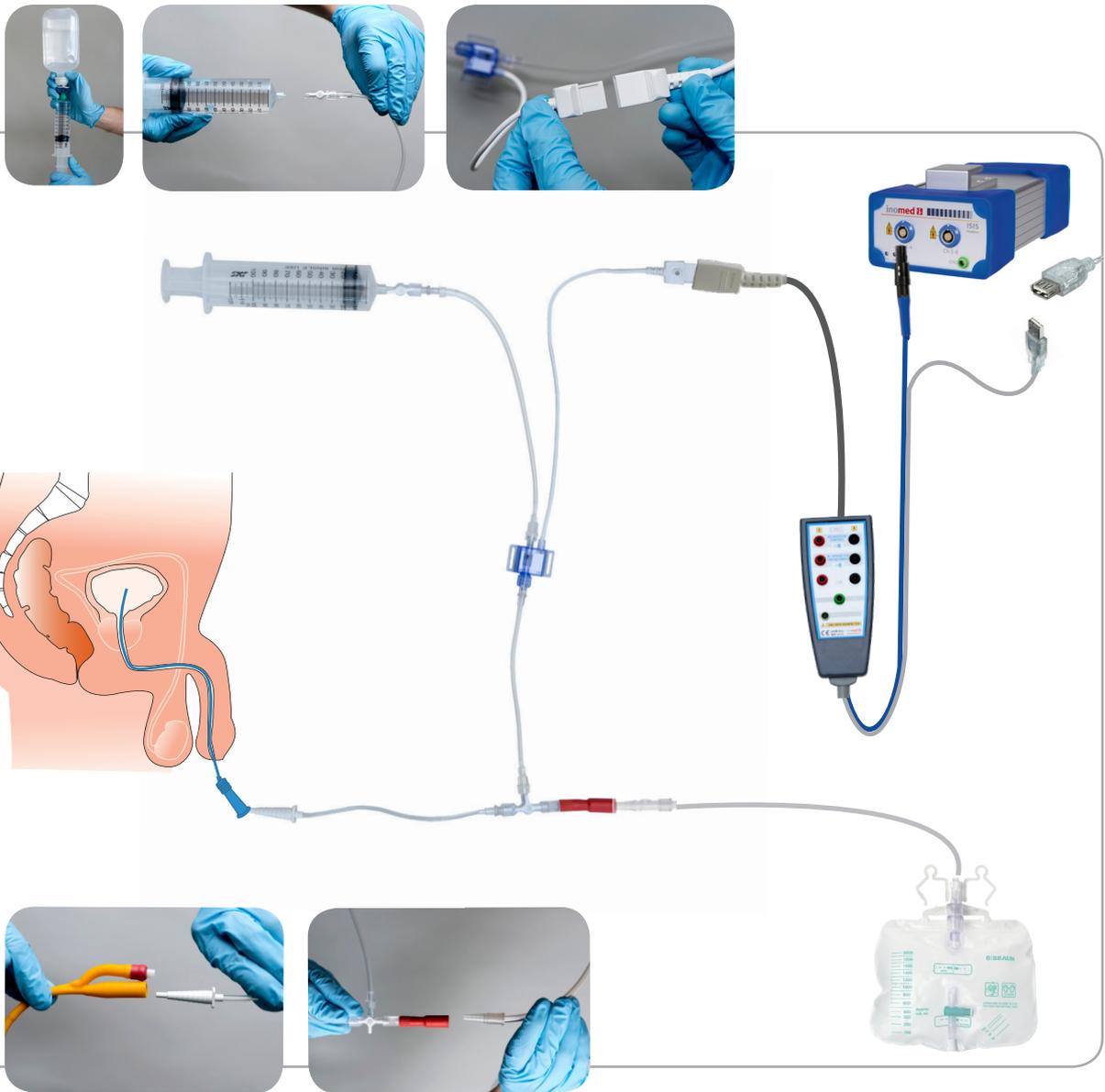
A good contact between the measurement electrodes and the patient's tissue is confirmed by a green display

**1. Venting the catheter connection set**

The catheter connection set can be connected to normal commercially available urinary catheters. Special catheters, e.g. with integrated temperature measurement, are also possible. The only requirement for connection is a stepped cone adapter as shown below.

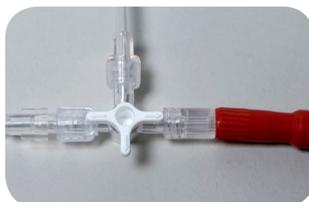
In order to ensure accurate pressure measurement the air in the catheter connection set must be extracted. NaCl solution is used for this. The two syringes included in the supply can be connected to a corresponding infusion bottle with the help of the spike, also supplied. Normally one completely filled syringe is sufficient for extracting the air.

**2. Connecting up the catheter connection set**



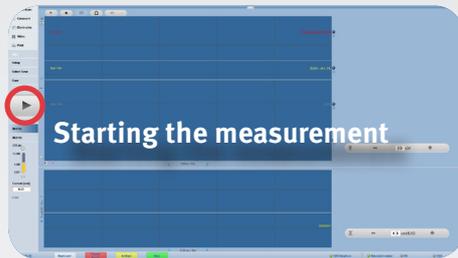
**3. Connecting the urine bag**

In order to allow the urine to flow from the bladder through the urinary catheter and into the urine bag, the 3-way valve is aligned as shown in the picture



## »» At the beginning of the operation

### 1. Starting the measurement



Measurement is started using the button shown above.

### 2. Setting the threshold



So that the software can correctly recognise the muscle response signals, the threshold values need to be adjusted. To do this, the threshold values on the right-hand control button must be set slightly above the physiological resting signal in each case. (see illustration)

### 3. Connecting up the stimulation probe



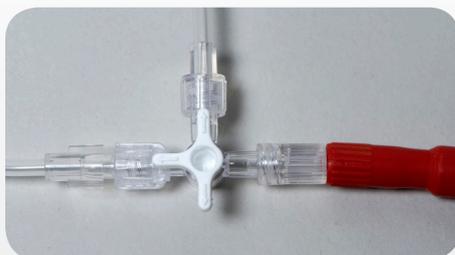
### 4. Function testing the probe



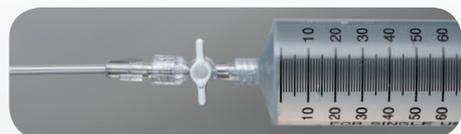
In order to confirm that the stimulation probe is functioning correctly it should be moistened shortly before the first nerve stimulation. This causes a stimulation tone to sound as confirmation.

## »» During the operation

### 5. Preparing for stimulation



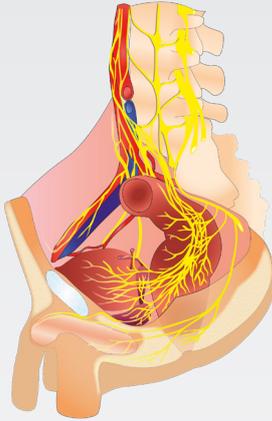
In order to be able to achieve a bladder pressure response during the stimulation, the 3-way valve must be turned as shown in the illustration. This will cause the flow of urine to the urine bag to be interrupted and the pressure sensor to be connected directly with the bladder.



Then the bladder must be filled with 200 ml NaCl solution. The two syringes enclosed can be used for this. In order to enable a bladder pressure measurement to be taken, the 2-way valve must then be closed as shown in the illustration.

**Note: Please discuss the procedure with the anaesthetist to avoid any misunderstandings here.**

## 6. Stimulation



The nerve structures in the minor pelvis are stimulated with the bipolar probe. This stimulation probe is used for localisation, function checking and mapping. A stimulation current of 8 mA is recommended here. The point of stimulation lies exclusively in the minor pelvis. Best suited for this are the inferior hypogastric plexus and the pelvic splanchnic nerves. Especially at the nerve structures coming from S3 and S4 very clear response signals are to be observed in the bladder pressure and also in the EMG signal from the internal anal sphincter. All nerve structures which are supplied by the nerves just mentioned or which innervate

them can, in principle, also be stimulated with the stimulation probe. Furthermore attention must be paid to ensure that there is as little tissue as possible between nerve and stimulation probe. Otherwise the response signal may be weakened or no longer triggered. If the nerves are covered with tissue and the measurement of response signals is not possible, there is the possibility of increasing the stimulation current slightly. However this is possible up to a maximum of the limit value set to 12 mA.

**Note: Complete relaxation of the patient should be requested at the beginning of stimulation from the anaesthetist. Unless there is complete relaxation, false-positive response signals may be produced.**

## 7. Starting recording



In order to be able to document the data measured, it is possible to produce a recording. In this case, confirm this by the corresponding button just before stimulation. Stop the recording again using the same button after the stimulation. Alternatively key F10 can be used to produce screen recordings.

## 8. Graph interpretation



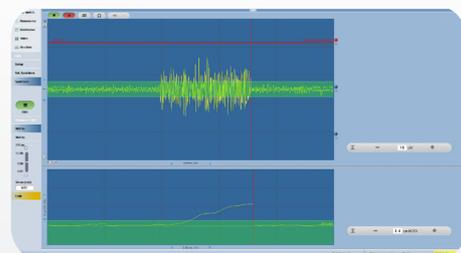
### **active stimulation without muscle response**

Stimulation starts automatically as soon as the stimulation probe is in contact with the tissue. In this case an intermittent beep tone sounds for 5 seconds during which the stimulation probe should not be moved.

## 9. After the end of a stimulation interval



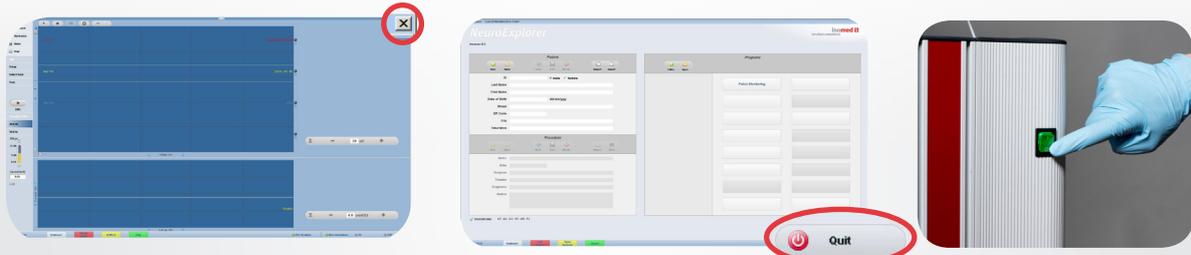
It is recommended that the fluid injected before the beginning of stimulation is extracted again. The two syringes can be used for this. Subsequently the 3-way valve must be turned to its original position to allow fluid flow into the urine bag.



### **active stimulation with muscle response**

If the threshold values set are exceeded in the pressure and/or EMG signal, this triggers a visual and acoustic confirmation signal.

## 10. Closing the measurement window and the programme



To close the measurement window, click on the top right button. The programme can now be closed by the “Quit” button.

**Note:** Please shut down the equipment as otherwise this may result in memory failure. Then switch off at the green button as shown in the illustration and only then should you pull out the plug.



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**inomed** 

inomed Medizintechnik GmbH  
Im Hausgruen 29  
79312 Emmendingen (GERMANY)

Tel. +49 7641 9414-0  
Fax +49 7641 9414-94  
info@inomed.com  
www.inomed.com

## Accessories information



Art.-No. 520 300  
**pIOM Box**  
for bladder pressure measuring

for connection to IONM devices,  
for use with disposable pressure  
converter with 1.5mm touchproof  
female connector

- USB powered
- delivered non-sterile
- non-autoclavable



Art.-No. 520 335  
**pIOM Set**  
with SDN Electrodes

complete set consisting of  
Catheter Connection Set  
for bladder pressure measuring

- SDN Electrodes
- fork probe 400mm
- single-use
- ETO-sterilized



Art.-No. 520 336  
**pIOM Set**  
with rectal electrode

complete set consisting of  
Catheter Connection Set  
for bladder pressure measuring

- rectal electrode
- fork probe 400mm
- single-use
- ETO-sterilized

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